

AMENDMENTS TO THE CLAIMS (THIS LISTING REPLACES ALL PRIOR LISTINGS):

1. (Currently Amended) A computer-implemented method of managing bandwidth comprising:  
receiving packets on an input port;  
classifying received packets in a classification engine;  
processing the classified packets in a processing system according to their classifications,  
including selecting processing from a group consisting of at least two of  
session bandwidth packet processing,  
rate shaping packet processing,  
admission control packet processing, and  
type of service (TOS) packet processing; and  
queuing packets in a queuing engine.
2. (Original) The computer-implemented method of claim 1 wherein the packets  
comprise network packets.
3. (Original) The computer-implemented method of claim 2 wherein the network packets  
comprise traffic types.
4. (Original) The computer-implement method of claim 3 wherein the traffic types  
comprise wide area network (WAN) traffic destined for a local area network (LAN).
5. (Original) The computer-implemented method of claim 3 wherein the traffic types  
comprise local area network (LAN) traffic destined for a wide area network (WAN).
6. (Original) The computer-implemented method of claim 1 wherein classifying  
comprises:  
generating hash values based on components of the network packets; and  
determining corresponding classes for the hash values.
7. (Original) The computer-implemented method of claim 6 wherein the components  
comprise 5-tuples.

8. (Original) The computer-implemented method of claim 7 wherein the 5-tuples comprise destination addresses, destination ports, source addresses, source ports and protocol numbers.

9. (Previously presented) The computer-implemented method of claim 1 wherein processing comprises rate shaping packet processing.

10. (Original) The computer-implemented method of claim 9 wherein rate-shaping processing comprises:

determining whether class borrowing is enabled for the class assigned to the packet;  
determining an advertised window size for a class that has class borrowing disabled by the algorithm:

$$C = B / (n)(D)$$

where C is the capacity of the class, B is the class bandwidth, n is the number of currently active connections and D is an estimate of round trip time of the connection; and

determining an advertised window size for a class that has class borrowing enabled by the algorithm:

$$C = B' / (n)(D)$$

where B' is the maximum of class bandwidth and burst bandwidth.

11. (Original) The computer-implemented method of claim 1 wherein processing comprises session bandwidth packet processing.

12. (Previously presented) The computer-implemented method of claim 11 wherein session bandwidth packet processing comprises:

generating a new class for the packet class if a packet class specifies a guaranteed minimum bandwidth;

assigning the new class the guaranteed minimum bandwidth; and

generating a 5-tuple filter for the new class.

13. (Original) The computer-implemented method of claim 12 wherein the 5-tuple filter comprises a destination address of the packet, a destination port of the packet, a source address of the packet, a source port and a protocol of the packet.

14. (Original) The computer-implemented method of claim 1 wherein processing comprises admission control packet processing.

15. (Previously presented) The computer-implemented method of claim 14 wherein admission control packet processing comprises session:

receiving a connection;

determining a class for the connection;

determining whether there is sufficient bandwidth for the class to guarantee a minimum bandwidth;

determining an admission directive from the class; and

processing the packets in the connection in response to the admission directive.

16. (Original) The computer-implemented method of claim 15 wherein the admission directive is squeeze.

17. (Original) The computer-implemented claim of 16 wherein processing comprises reclassifying the packet to a default class.

18. (Original) The computer-implemented method of claim 15 wherein the admission directive is drop.

19. (Original) The computer-implemented claim of 18 wherein processing comprises dropping the connection.

20. (Original) The computer-implemented method of claim 15 wherein the admission directive is deny.

21. (Original) The computer-implemented claim of 20 wherein processing comprises generating a reset packet.

22. (Original) The computer-implemented method of claim 1 wherein processing comprises type of service (TOS) packet processing.

23. (Previously presented) The computer-implemented method of claim 22 wherein TOS packet processing comprises changing TOS values to match underlying application.

24. (Previously presented) The computer-implemented method of claim 1 wherein processing comprises:

session bandwidth packet processing;  
rate shaping packet processing;  
admission control packet processing; and  
type of service (TOS) packet processing.

25. (Original) The computer-implemented method of claim 1 wherein queuing comprises placing processed packets in queues according to classes.

26. (Previously presented) A bandwidth management system comprising:  
an input port, the input port connected to a classification engine;  
a processing engine, the processing engine connected to the classification engine,  
wherein the processing engine comprises at least two of  
a session bandwidth engine,  
a rate-shaping engine,  
an admission control engine, and  
a type of service (TOS) processing engine; and  
a queuing engine connected to the processing engine and to an output port.

27. (Previously presented) The bandwidth management system of claim 26 wherein the processing engine comprises:

session bandwidth engine.  
a rate-shaping engine;  
an admission control engine; and  
type of service (TOS) processing engine.

28. (Original) The bandwidth management system of claim 26 further comprising a policy manager connected to the processing and queuing engine.

29. (Original) The bandwidth management system of claim 28 wherein the policy manager is an input device providing parameters.

30. (Original) The bandwidth management system of claim 29 wherein the parameters comprise a class bandwidth and class priority.

31. (Withdrawn) A computer-implemented method of managing bandwidth comprising:

classifying network packets according to traffic types for placement in class queues;

generating parent classes for each class;  
allocating parent bandwidths to the parent classes;  
assigning a parent priorities to the parent classes;  
generating sub-parent classes for each parent class; and  
providing a minimum bandwidth to the sub-parent classes.

32. (Withdrawn) The computer-implemented method of claim 31 wherein the minimum bandwidth is the parent bandwidth.

33. (Withdrawn) The computer-implemented method of claim 31 wherein the sub-parent classes borrow bandwidth from the parent class.

34. (Withdrawn) The computer-implemented method of claim 31 further comprising processing the packets in a connection in response to an admission directive.

35. (Withdrawn) The computer-implemented method of claim 34 wherein the admission directive is squeeze.

36. (Withdrawn) The computer-implemented claim of 35 wherein processing comprises reclassifying the packet to a default class.

37. (Withdrawn) The computer-implemented method of claim 34 wherein the admission directive is drop.

38. (Withdrawn) The computer-implemented claim of 37 wherein processing comprises dropping the connection.

39. (Withdrawn) The computer-implemented method of claim 34 wherein the admission directive is deny.

40. (Withdrawn) The computer-implemented of claim 39 wherein processing comprises generating a reset packet.

41. (Original) The computer-implemented method of claim 1 further comprising receiving parameters from a policy manager.

42. (Original) The computer-implemented method of claim 41 wherein the parameters comprise a class bandwidth and a class priority.

43. (Original) The computer-implemented method of claim 1 further comprising:  
    queuing the processed packets in a queuing engine; and  
    scheduling the queued packets on an output port.

44. (Previously presented) The computer-implemented method of claim 1 wherein processing the classified packets includes selecting processing from a group consisting of  
    session bandwidth packet processing,  
    rate shaping packet processing  
    admission control packet processing, and  
    type of service (TOS) packet processing.